UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 4260

CITY ROUTE 154

OVER THE

NORTH CHANNEL OF THE MISSISSIPPI

DISTRICT 6 - WINONA COUNTY, CITY OF WINONA

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 5221 (CEI 150)

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No.4260, Piers 1 through 13, were found to be in satisfactory condition. The submerged concrete was typically in fair condition with moderate scaling around the waterline and random widespread hairline cracking throughout the pier shafts. Since the previous inspection, the structure has been rehabilitated with extensive riprap placed around all of the piers to address footing undermining. The riprap typically extends up to between top of the footing to 2 feet below the top.

INSPECTION FINDINGS:

(A) The channel bottom of Piers 1 through 12 consisted of riprap (1 to 3 feet in diameter) that has been added around the entire perimeter of all piers. The riprap typically extends up to between top of the footing to no more than 2 feet below top of footing.

(B) The footing at Pier 1 was exposed at the upstream (3 feet vertical face exposure) and downstream (1 foot vertical face exposure) corners. At the upstream half, there is a row of 5 to 6 timber piles (old formwork) next to the footing.

(C) Moderate concrete scaling was observed on all pier shafts from the waterline to 2 feet below the waterline with typical penetrations of ½ inch and maximum penetrations of up to 1 inch. Random vertical and horizontal hairline cracks were also observed on the concrete shaft surfaces widespread throughout all piers. Cracking often has efflorescence associated with it.

RECOMMENDATIONS:

(A) Placement of riprap at the piers has substantially improved status of bridge and its structural safety. Therefore, reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Daniel G. Stromberg

Date 6/30/2008 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.

Daniel G. Stromberg
Registered Professional
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 4260

Feature Crossed: North Channel of the Mississippi River

Feature Carried: City Route 154

Location: District 6 - Winona County, City of Winona

Bridge Description: The superstructure consists of twenty-four spans of reinforced concrete arches or beams. The main spans across the channel are open spandrel reinforced concrete arches. The bridge is supported by reinforced concrete piers which are founded on timber piles. The channel piers are numbered 1 through 13 starting with Pier 1 on the east shore.

2. INSPECTION DATA

Professional Engineer/Team Leader: Daniel G. Stromberg, P.E., S.E.

Dive Team: Clayton G. Brookins, Valerie Roustan

Date: October 25, 2007

Weather Conditions: Sunny, 62°F

Underwater Visibility: 1.0 feet

Waterway Velocity: 1.5 f.p.s.

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1 through 13.

General Shape: Oblong rectangular shafts with rounded corners which sit on rectangular footings that are founded on timber piles.

Maximum Water Depth at Substructure Inspected: Approximately 12.0 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap on the upstream end of Pier 2.

Water Surface: The waterline was approximately 7.3 feet below the springline at the downstream end of Pier 1.
Assumed Waterline Elevation = 92.7.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 6

Item 61: Channel and Channel Protection: Code 7

Item 92B: Underwater Inspection: Code B/10/07

Item 113: Scour Critical Bridges: Code P/07

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.
_____ Yes X No

Photograph 1. View of Pier 1, Looking Southeast.


Photograph 2. View of Pier 2, Looking South.

Photograph 3. View of Pier 3, Looking South.

Photograph 4. View of Pier 4, Looking South.

Photograph 5. View of Pier 5, Looking South.

Photograph 6. View of Pier 6, Looking South.

Photograph 7. View of Pier 7, Looking South.

Photograph 8. View of Pier 8, Looking South.

Photograph 9. View of Pier 9, Looking South.

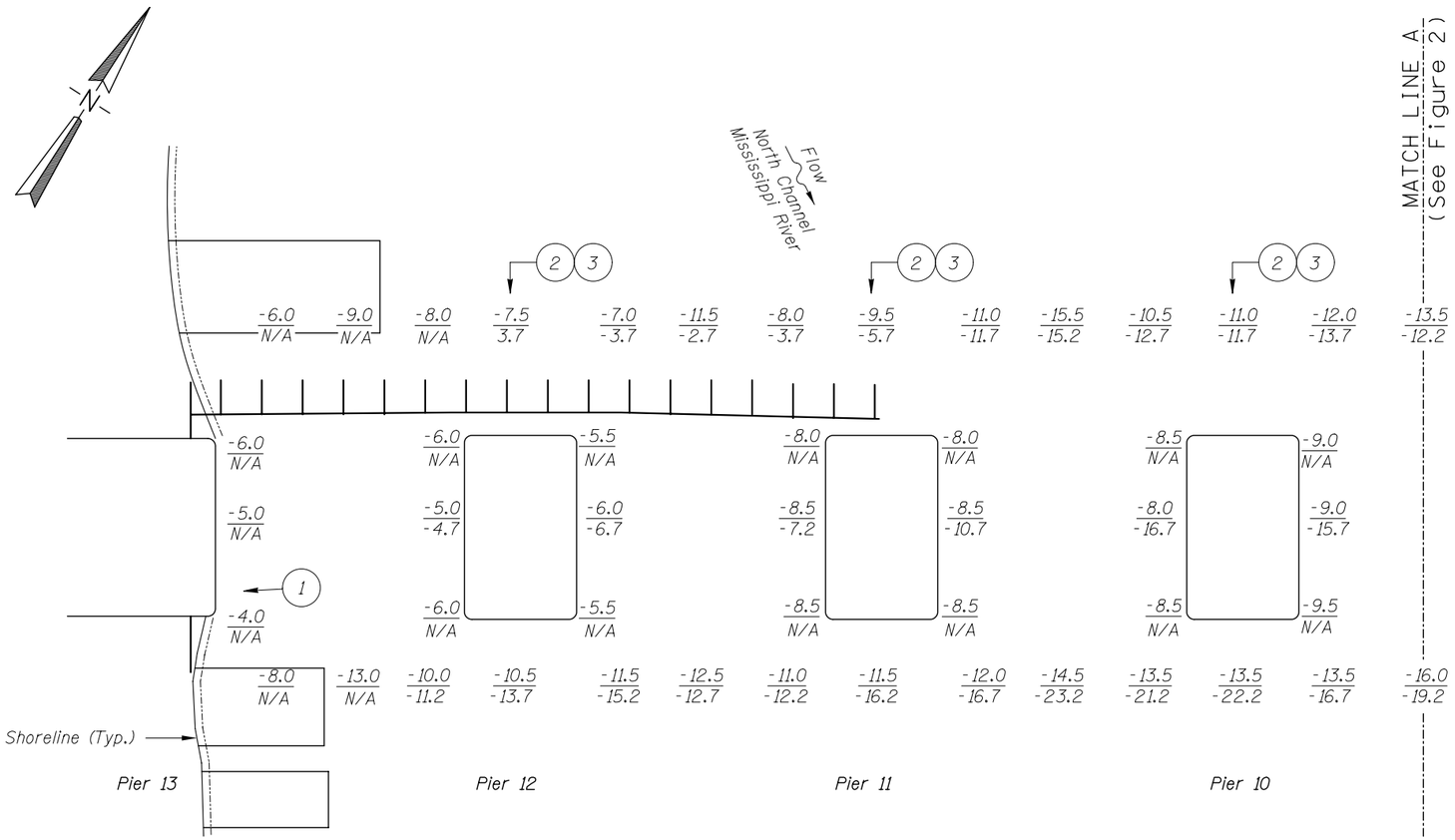

Photograph 10. View of Pier 10, Looking South.

Photograph 11. View of Pier 11, Looking South.

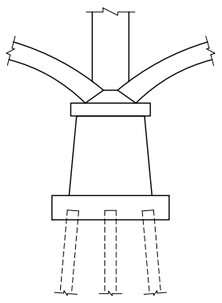
Photograph 12. View of Pier 12, Looking South.

Photograph 13. View of Pier 13, Looking West.

Photograph 14. View of Typical Cracking with Efflorescence.



SOUNDING PLAN



TYPICAL END VIEW OF PIERS

GENERAL NOTES:

1. Piers 1 through 13 were inspected underwater.
2. At the time of inspection on October 25, 2007, the waterline was located approximately 7.3 feet below the springline at the downstream end of Pier 1. Since design drawings were not available a reference elevation of 100.0 was assumed. Based on the assumed reference elevation the waterline elevation was 92.7.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.

INSPECTION NOTES:

(1) The channel bottom at Pier 13 consisted of silt with small stones (no new riprap). Stone and rubble was observed at upstream and downstream ends.

(2) The channel bottom of Piers 1 through 12 consisted of newly placed riprap typically 1 to 2 feet in diameter with a maximum diameter of up to 3 feet. It was observed around the entire perimeter of all piers typically extending to top of footing or to no lower than 2 feet below top of footing.

(3) The submerged concrete was typically in satisfactory condition with moderate scaling from the waterline to 2 feet below the waterline with typical penetrations of 1/2 inch and maximum penetrations of up to 1 inch. Widespread random vertical and horizontal hairline cracks with efflorescence were also observed on the concrete surfaces throughout pier shafts.

Legend

-2.0 / -5.2 — Sounding Depth from Waterline (10/25/07) / Sounding Depth from Waterline (10/2/02)

Timber Debris

Note:

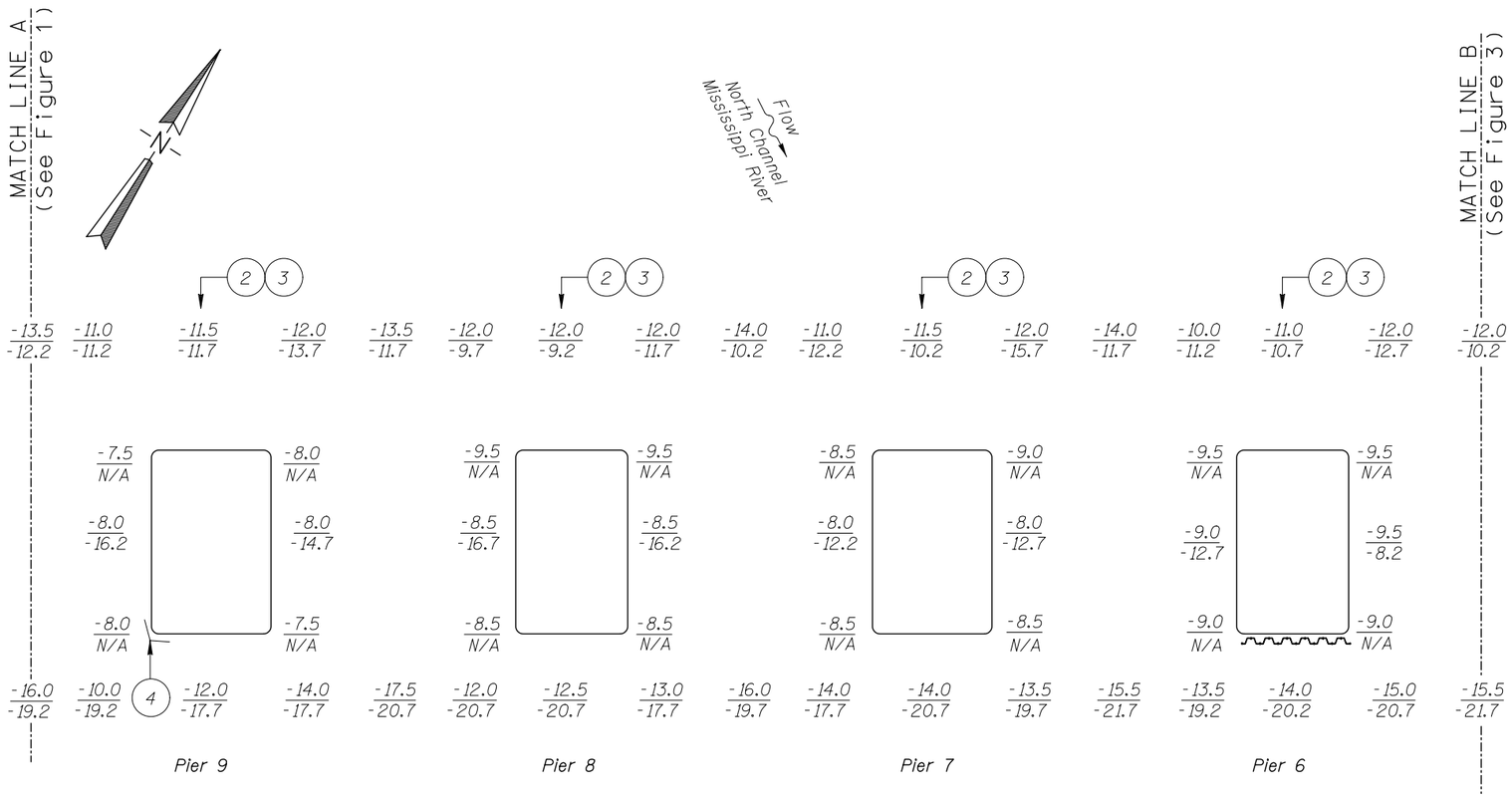
All soundings based on 2007 waterline location.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 4260
OVER THE NORTH CHANNEL OF THE MISSISSIPPI RIVER
DISTRICT 6, WINONA COUNTY

INSPECTION AND SOUNDING PLAN

Drawn By: LJ	COLLINS ENGINEERS, INC. 123 North Wacker Drive Suite 300 Chicago, Il. 60606 (312) 704-9300 www.collinsengr.com	Date: OCT. 2007
Checked By: DGS		Scale: NTS
Code: 52210150		Figure No.: 1



SOUNDING PLAN

INSPECTION NOTES:

(2) *The channel bottom of Piers 1 through 12 consisted of newly placed riprap typically 1 to 2 feet in diameter with a maximum diameter of up to 3 feet. It was observed around the entire perimeter of all piers typically extending to top of footing or to no lower than 2 feet below the top of footing.*

(3) *The submerged concrete was typically in satisfactory condition with moderate scaling from the waterline to 2 feet below the waterline with typical penetrations of 1/2 inch and maximum penetrations of up to 1 inch. Widespread random vertical and horizontal hairline cracks with efflorescence were also observed on the concrete surfaces throughout all pier shafts.*

(4) *Pier 9 exhibited an area of section loss on the downstream west corner from 1 foot below to 3 feet below the waterline with up to 2 inches of penetration.*

Legend

-2.0 / -5.2 *Sounding Depth from Waterline (10/25/07) / Sounding Depth from Waterline (10/2/02)*

Timber Debris

Note:

All soundings based on 2007 waterline location.

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
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INSPECTION AND SOUNDING PLAN

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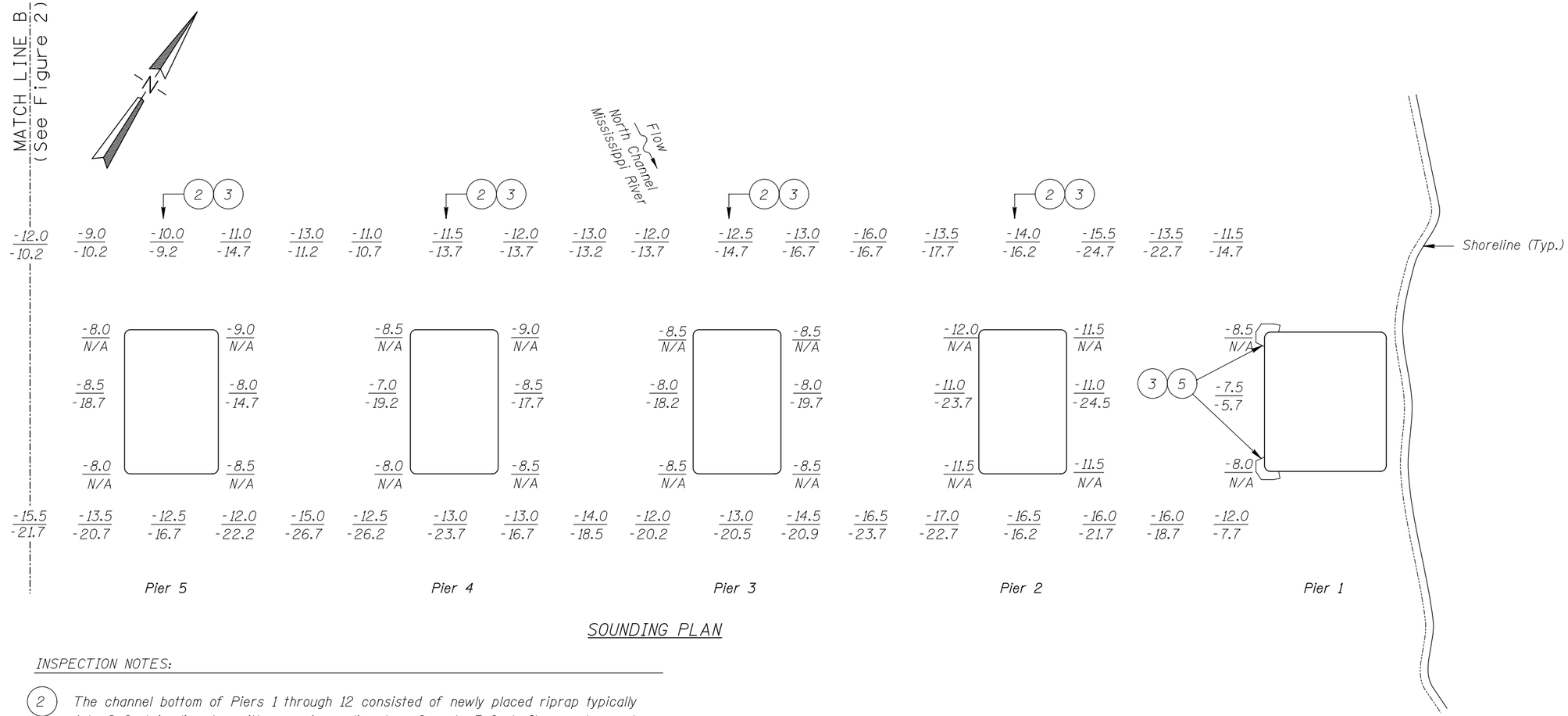
Code: 52210150		Figure No.: 2



SOUNDING PLAN

INSPECTION NOTES:

(2) The channel bottom of Piers 1 through 12 consisted of newly placed riprap typically 1 to 2 feet in diameter with a maximum diameter of up to 3 feet. It was observed around the entire perimeter of all piers typically extending to top of footing or to no lower than 2 feet below top of footing.

(3) The submerged concrete was typically in satisfactory condition with moderate scaling from the waterline to 2 feet below the waterline with typical penetrations of 1/2 inch and maximum penetrations of up to 1 inch. Widespread random vertical and horizontal hairline cracks with efflorescence were also observed on the submerged concrete throughout all pier shafts.

(5) The top of the footing at Pier 1 was exposed at the upstream (3 feet vertical exposure) and downstream (1 foot vertical exposure) corners. 2 feet diameter riprap was observed up against the footing.

(6) At the upstream half there is a row of 5 to 6 timber piles next to the footing and old formwork.

Legend

-2.0 / -5.2 Sounding Depth from Waterline (10/25/07) / (10/2/02)

Timber Debris

Note:

All soundings based on 2007 waterline location.

Note:

Refer to Figure 1 for General Notes.

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UNDERWATER BRIDGE INSPECTION

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INSPECTION AND SOUNDING PLAN

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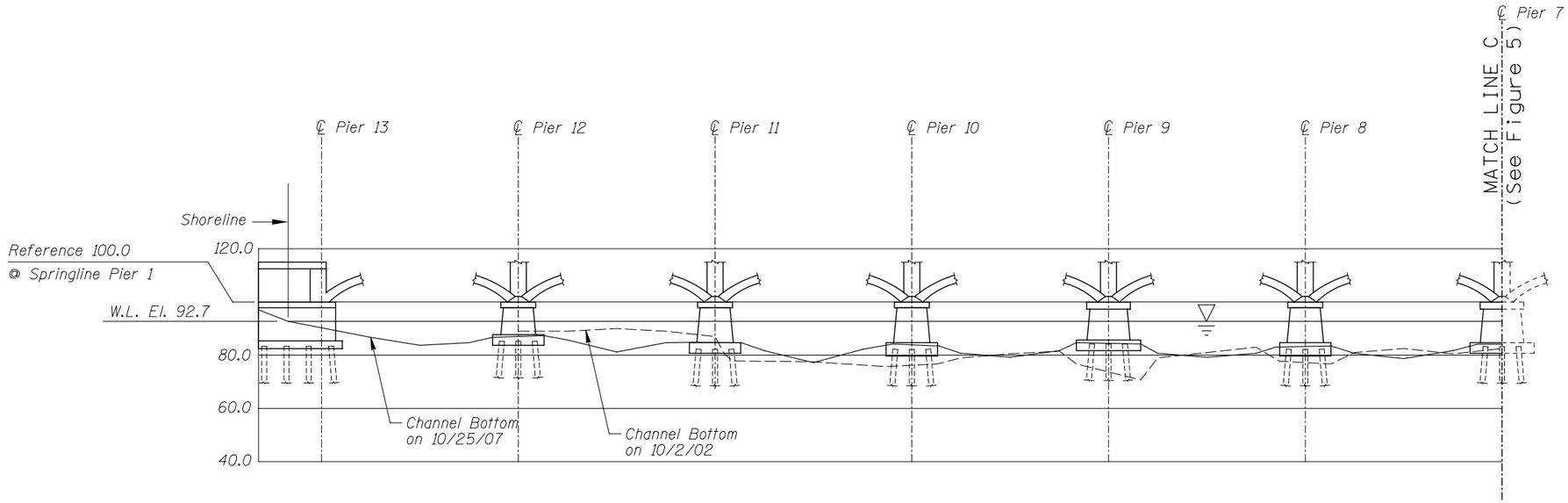
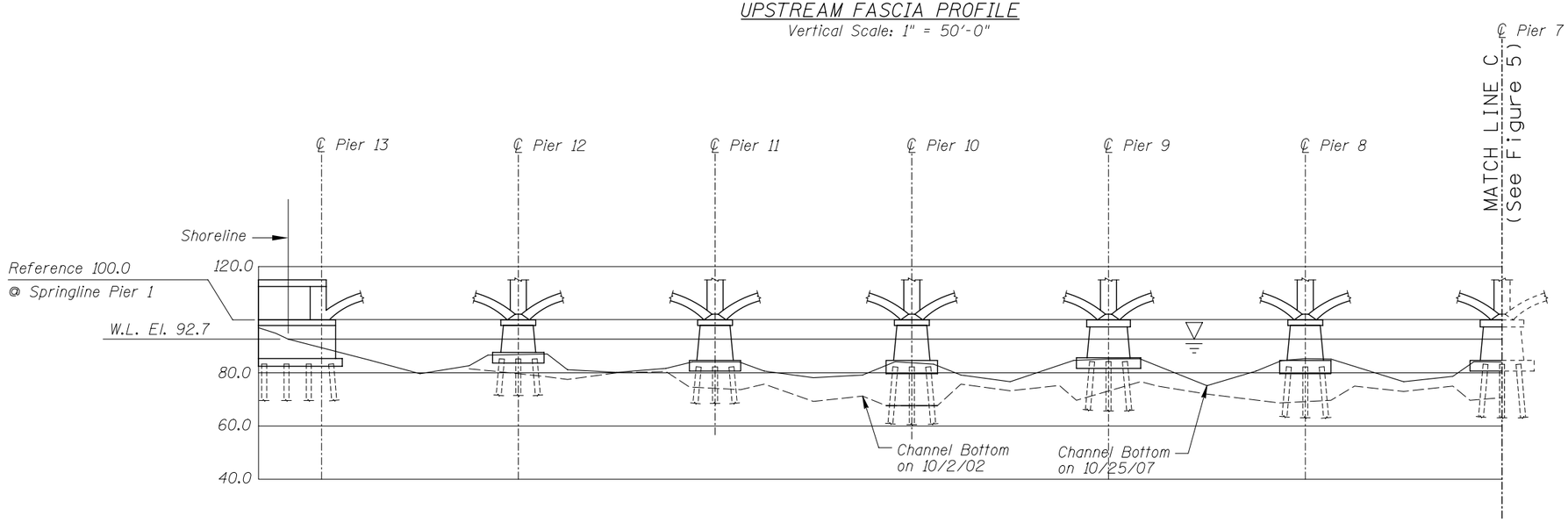
Code: 52210150		Figure No.: 3



UPSTREAM FASCIA PROFILE

Vertical Scale: 1" = 50'-0"



DOWNSTREAM FASCIA PROFILE

Vertical Scale: 1" = 50'-0"

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 4260
OVER THE NORTH CHANNEL OF THE MISSISSIPPI RIVER
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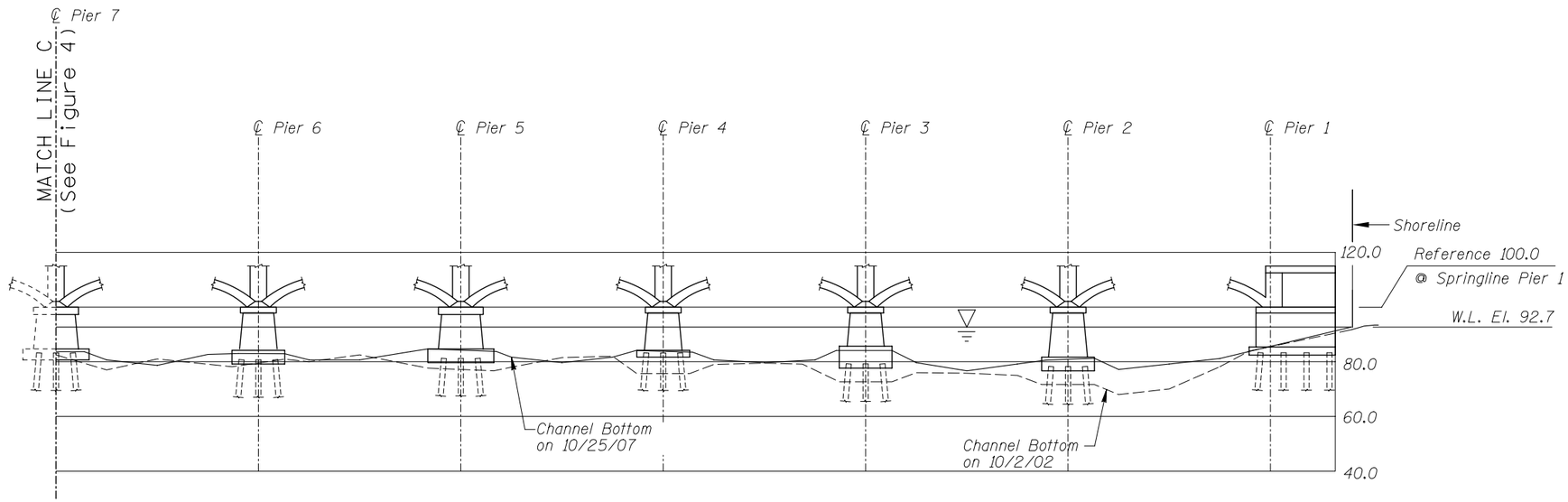
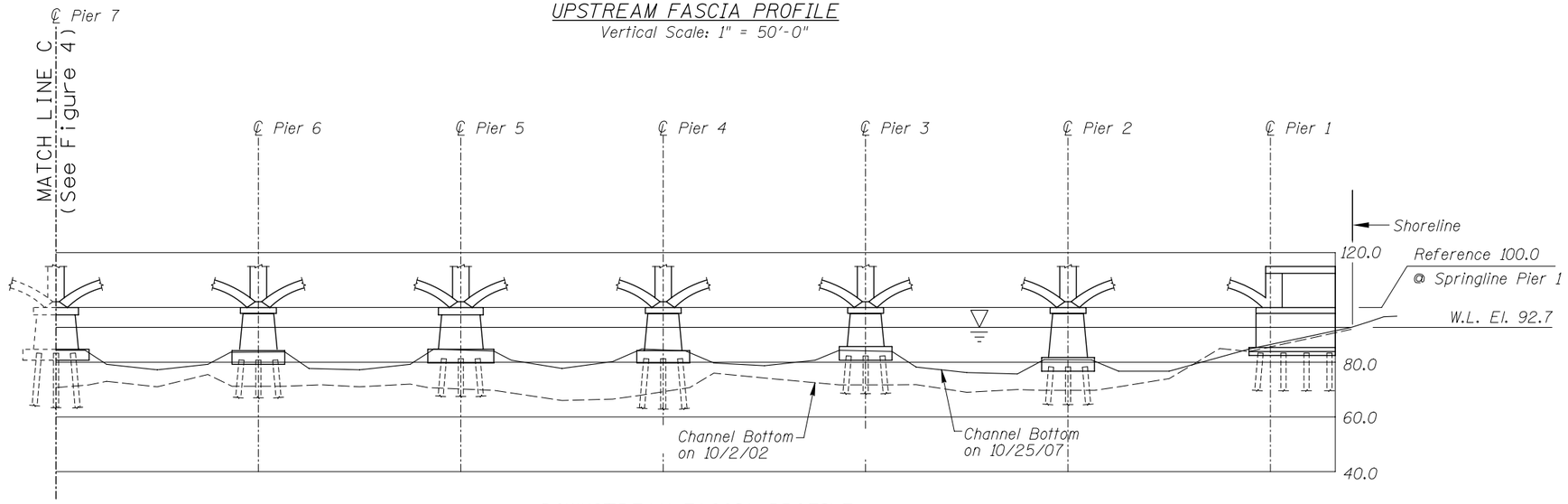
UPSTREAM AND DOWNSTREAM
FASCIA PROFILES

Drawn By: LJ	COLLINS ENGINEERS 123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: OCT. 2007
Checked By: DGS		Scale: NTS
Code: 52210150		Figure No.: 4



UPSTREAM FASCIA PROFILE

Vertical Scale: 1" = 50'-0"



DOWNSTREAM FASCIA PROFILE

Vertical Scale: 1" = 50'-0"

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 4260
OVER THE NORTH CHANNEL OF THE MISSISSIPPI RIVER
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UPSTREAM AND DOWNSTREAM FASCIA PROFILES

Drawn By: LJ	COLLINS ENGINEERS 123 North Wacker Drive Suite 300 Chicago, Il. 60606 (312) 704-9300 www.collinsengr.com	Date: OCT. 2007
Checked By: DGS		Scale: NTS
Code: 52210150		Figure No.: 5

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES
DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: October 25, 2007
ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E., S.E.
BRIDGE NO: 4260 WEATHER: Sunny, 62°F
WATERWAY CROSSED: North Channel of the Mississippi River
DIVING OPERATION: X SCUBA _____ SURFACE SUPPLIED AIR
_____ OTHER _____
PERSONNEL: Clayton G. Brookins, Valerie Roustan
EQUIPMENT: Scuba, Scraper, Sounding Pole, Probe Rod, Camera, Boat, Fathometer
TIME IN WATER: 8:45 a.m.
TIME OUT OF WATER: 11:45 a.m.
WATERWAY DATA: VELOCITY 1.5 f.p.s.
VISIBILITY 1 foot
DEPTH 12 feet maximum at Pier 2
ELEMENTS INSPECTED: Piers 1 through 13
REMARKS: Overall, Piers 1 through 12 were now found to be in satisfactory. Placement of new riprap at Piers 1 through 12 has substantially improved structural stability of bridge. The concrete surfaces were typically in fair condition with moderate scaling near the waterline and widespread random hairline cracking with efflorescence. Since the previous inspection, riprap (1-3 feet in diameter) has been added around the entire perimeter of all piers (except Pier 13), typically extending to top of the footing or to no lower than 2 feet below top. The top of the footing at Pier 1 was exposed at the upstream (3 feet vertical face exposure) and downstream (1 foot vertical face exposure) corners. At the upstream half, there is a row of 5 to 6 timber piles (old formwork) next to the footing.

FURTHER ACTION NEEDED: X YES _____ NO

Placement of riprap at the piers has substantially improved status of bridge and its structural safety. Therefore, reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 4260
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Daniel G. Stromberg, P.E., S.E.
WATERWAY CROSSED North Channel of the Mississippi River

INSPECTION DATE October 25, 2007

NOTE: USE ALL APPLICABLE CONDITION DEFINITIONS AS DEFINED IN THE MINNESOTA RECORDING AND CODING GUIDE INCLUDING GENERAL, SUBSTRUCTURE, CHANNEL AND PROTECTION, AND CULVERTS AND WALL DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

			SUBSTRUCTURE						CHANNEL					GENERAL					
UNIT REFERENCE NO.		MAXIMUM DEPTH OF WATER	PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
	UNIT DESCRIPTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 1	8.5’	6	6	7	7	N	6	6	N	N	N	6	6	N	6	N	N	N
	Pier 2	16.5’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	N	N	N
	Pier 3	13.0’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	N	N	N
	Pier 4	13.0’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	N	N	N
	Pier 5	13.0’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	N	N	N
	Pier 6	14.0’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	N	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, Piers 1 through 12 were now found to be in satisfactory. Placement of new riprap at Piers 1 through 12 has substantially improved structural stability of bridge. The concrete surfaces were typically in fair condition with moderate scaling near the waterline and widespread random hairline cracking with efflorescence. Since the previous inspection, riprap (1-3 feet in diameter) has been added around the entire perimeter of all piers (except Pier 13), typically extending to top of the footing or to no lower than 2 feet below top. The top of the footing at Pier 1 was exposed at the upstream (3 feet vertical face exposure) and downstream (1 foot vertical face exposure) corners. At the upstream half, there is a row of 5 to 6 timber piles (old formwork) next to the footing.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 4260
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Daniel G. Stromberg, P.E., S.E.
WATERWAY CROSSED North Channel of the Mississippi River

INSPECTION DATE October 25, 2007

NOTE: USE ALL APPLICABLE CONDITION DEFINITIONS AS DEFINED IN THE MINNESOTA RECORDING AND CODING GUIDE INCLUDING GENERAL, SUBSTRUCTURE, CHANNEL AND PROTECTION, AND CULVERTS AND WALL DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

			SUBSTRUCTURE						CHANNEL					GENERAL					
UNIT REFERENCE NO.	UNIT DESCRIPTION	MAXIMUM DEPTH OF WATER	PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 7	14.0’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	N	N	N
	Pier 8	12.5’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	N	N	N
	Pier 9	12.0’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	N	N	N
	Pier 10	13.5’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	N	N	N
	Pier 11	11.5’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	N	N	N
	Pier 12	10.5’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	N	N	N
	Pier 13	6.0’	N	6	N	7	N	6	7	N	N	N	7	6	N	N	N	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, Piers 1 through 12 were now found to be in satisfactory. Placement of new riprap at Piers 1 through 12 has substantially improved structural stability of bridge. The concrete surfaces were typically in fair condition with moderate scaling near the waterline and widespread random hairline cracking with efflorescence. Since the previous inspection, riprap (1-3 feet in diameter) has been added around the entire perimeter of all piers (except Pier 13), typically extending to top of the footing or to no lower than 2 feet below top. The top of the footing at Pier 1 was exposed at the upstream (3 feet vertical face exposure) and downstream (1 foot vertical face exposure) corners. At the upstream half, there is a row of 5 to 6 timber piles (old formwork) next to the footing.

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USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.